Christiaan Barnard: his first transplants and their impact on concepts of death

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The death of Christiaan Barnard has revived some personal memories. More importantly, it reminds us that his operations at the end of 1967 initiated the production of a set of legal and philosophical justifications for the removal of a beating heart from a prospective donor. Thirty four years later they remain a topic of controversy.

Summary points

In 1967, when Christiaan Barnard carried out the first human heart transplants, there were no guidelines for the diagnosis of death of beating heart donors

The relative success of Barnard's second heart transplant was followed by a period of uncontrolled copycat operations in many countries, with predictably poor results

The UK definition of brainstem death, introduced by the Conference of Royal Colleges and their Faculties in 1976, has proved reliable and robust in clinical practice

The operations and my minor involvement

On 3 December 1967 the heart of a young female accident victim was transplanted into a middle aged man suffering from intractable heart failure caused by coronary artery disease. He died 18 days later from extensive bilateral pneumonia. This limited success was hailed throughout the world as a major medical triumph, turned Barnard into an international superstar, and provided the impetus for him to try it again.

His second subject, Dr Philip Blaiberg, was given a heart transplant less than two weeks later, which brings me to the very minor role I played in the whole saga. The "donor," a young man who had had a severe subarachnoid haemorrhage while bathing in the sea, was admitted under my care. He was, in fact, the last patient I was permitted to admit to Groote Schuur Hospital in Cape Town. A government banning order (under the blanket "Suppression of Communism Act") included a clause that stopped me from teaching or entering any educational institution. This came into effect next morning.

On my last night as the consultant on-call I was asked by the transplant team to pronounce the man "dead" and confirm that his heart would be suitable for transplantation. Any misgivings I might have felt about declaring someone dead while his heart was still beating were confounded by the thought that hesitation on my part—a recognised opponent of the government—might be construed as an attempt to undermine the prestige that Barnard's exploit had conferred on the country. Despite this, I hesitated. My patient still had a few elicitable neurological reflexes. I went home, returned an hour or two later, still found the reflexes, and declined to pronounce him dead.

At this stage the transplant team was waiting in the wings and was clearly dismayed at my verdict. The professor of surgery (not Barnard, although he was present) came up and said: "God [it sounds better with a guttural Afrikaans pronunciation], Bill, what sort of heart are you going to give us?" I said I could not agree to the removal of the heart from someone who still showed signs of "life," and then spent a sleepless night wondering whether I was being unnecessarily obstructive. I went to the hospital very early next morning and satisfied myself that I could no longer elicit the reflexes, and the surgery went ahead. Dr Blaiberg lived for 18 months with his new heart. It was the success of this operation that secured the future of heart transplants. Had it failed, I suspect further attempts would have been deferred for some years.

As a footnote, although the operation almost certainly extended Blaiberg's life, the quality of the extension was questionable. Despite reports of his return to normal life—including press reports of his prompt resumption of sexual intercourse with his wife—he was left with considerable disability. A syndicated photograph of him lying in the sea happily splashing in the waves appeared in the world's press as testimony to his remarkable recovery. The distinguished politician Helen Suzman told me that she had, by chance, taken a stroll along the same beach that day and stumbled on Blaiberg's venture into the sea. He was carried into the water, the entourage stepped back, cameras flashed, and he was hauled out before he disappeared helplessly under the waves.

Why Cape Town?

When people have become aware of my rather tenuous connection with Barnard's exploit I have often been asked why the world's first heart transplant came to be carried out in Cape Town rather than one of the leading centres in the United States or Europe. The first point to make is that the standard of medicine in Cape Town in the 1960s was advanced and sophisticated. There were well equipped research laboratories and an ethos in which research and initiative were encouraged. There was a large complement of full time doctors who combined their clinical care and teaching in Groote Schuur Hospital with experimental work in the adjacent medical school. A fruitful partnership existed between the provincial administration which ran the hospital services and the university, similar to the "knock-for-knock" agreement that so profitably characterised British medicine until the past decade or so. Full time academic staff were sponsored to go on overseas visits to keep abreast of new advances and


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Dr Philip Blaiberg was Barnard's second transplant patient

disseminate their knowledge on their return. There was excellent collaboration between departments, clinically and in research, notably in cardiology, in which an outstanding team of physicians worked closely with a strong surgical team headed by Barnard. Cape Town was by no means an academic backwater, the environment was conducive to innovation.

What was relatively unusual was the presence in the medical school of a strong department of experimental surgery, founded with remarkable perspicacity some 30 years earlier. In 1958 Barnard was appointed as its head, and he began to develop an ambitious programme of open heart surgery. He was egocentric, hardworking, clever, ambitious, brash, and somewhat arrogant; he functioned on the principle that anything others could do he could do at least as well. When a report appeared that a Russian surgeon had grafted a second head on to a dog, Barnard immediately did the same thing, a grotesque accomplishment he proudly displayed to those of us who were in the medical school at the time. There was no clear purpose to this other than to show his technical virtuosity.

By the late 1960s several US cardiac surgeons, notably Norman Shumway, had spent years trying to perfect heart transplantation, largely through experiments on dogs. They were ready to transfer the operation to humans but were concerned about the ethics and, more importantly, the legality of "killing" a person by removing the heart. In comparison, Barnard's preparatory experimental work in heart transplantation was negligible, and many Americans to this day think he jumped the gun to get ahead of the front runners in the field. The operation itself was not considered technically difficult compared with, say, surgery to repair complex congenital cardiac deformity. What inhibited US surgeons were ethical and legal considerations rather than technical skill. Opinion in South Africa was more permissive, the removal of the heart did not arouse such strong feelings of abhorrence, there was less likelihood of criticism that this would, in fact, "kill" the donor. Fewer questions would have been asked and there would have been less accountability had the operation failed. And, in Barnard, South Africa had a man who was prepared to act and then face the consequences.

His achievement was hailed as a near-miracle. To the South African government, facing great criticism and the threat of ostracism because of its inhumane apartheid policies, it was a godsend. Things couldn't be too bad in a country that produced such an outstanding first in medicine. On 30 December 1967—within a few weeks of the first operation and timely enough to report the recipient's death and necropsy findings—a special issue of the *South African Medical Journal* celebrated the event.[1] It contained a dozen articles and editorials about all aspects of the operation. Significantly, apart from a few editorial generalisations, there was no mention of the ethical or even legal issues surrounding removal of the heart from the donor and no suggestion that she might have been regarded as living when she was taken into theatre for removal of her heart.

It has been postulated that the reason why the operation could so easily take place in South Africa was the climate of relative disregard for human life. While this might have been true in certain contexts, it did not exist to any material degree in the medical world and certainly not at Groote Schuur Hospital, where all races received treatment of the highest standard. In considering a donor for the first operation great care was taken to select a white person to obviate the criticism that would surely have followed had the heart of a black person been taken for a white recipient.

The immediate aftermath

Much damage was done to the image of heart transplantation by the immediate unseemly scramble to get on the bandwagon. In 1968, the year after Barnard's two operations, 107 transplants were carried out by 64 surgical teams in 24 countries. The results were predictably bad: operations were performed by ill-trained surgeons without proper back up, matching of donors and recipients was poor, there was little appreciation of the need for meticulous aftercare and the management of rejection. Added to this was the extraordinary hype accorded to the operation by the media, which was not exactly discouraged by some of the key figures. Barnard himself indulged in a rather impetuous, flamboyant, and undignified global "lap of honour." (When he returned to South Africa he was instructed by the government to repeat the trip, this time accompanied by his wife and subject to a more sedate programme laid down in advance.) In London a cardiac team led by another Cape Town graduate, Donald Ross, was photographed for the newspapers having performed a copycat operation (with fatal outcome), bearing aloft a Union Jack and a poster saying "We're backing Britain." Gradually the circus aspects subsided, and a few properly trained surgeons working


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Christiaan Barnard explains heart transplantation

The British cardiac team led by Donald Ross (centre) after their copycat transplantation

with good support teams settled down to show that the operation could be done safely, saving many lives that would otherwise have been lost.

At the same time, disquiet was expressed about the propriety of transplanting the heart. In people's minds this organ was endowed with almost mystical qualities—it was the seat of love and other emotions, and disappointed lovers died of a "broken heart." Its transfer from one person to another was regarded as an unnatural act, meddling with "personhood" and trespassing into territory that had a spiritual quality. Malcolm Muggeridge referred to it as "the final degradation of our Christian way of life." Apart from these special qualities, the heart was closely associated with concepts of life and death: if it was beating the person was alive, when it stopped the person was dead. Nothing could be more final than its removal—and the process of removal, by which life was terminated, began to worry more thoughtful critics.

Brain death

Both of Barnard's transplantations were performed in December 1967. In September of the following year an ad hoc committee of Harvard Medical School produced a report on the "hopelessly unconscious patient."[2] The committee members agreed that life support could be withdrawn from patients diagnosed with "irreversible coma" or "brain death" (terms they used interchangeably) and that, with appropriate consent, their organs could be removed for transplantation. They stressed that their primary concern was to provide an acceptable mechanism to permit withdrawal of life support from such patients, and the sanction this gave to removal of the heart for transplantation was secondary. However, the problem of terminating life support had vexed physicians for a decade or more—ever since it had become possible to maintain cardiac, respiratory, and metabolic functions almost indefinitely in profoundly and irreversibly unconscious patients. The timing of the report so soon after the heart transplant suggests that this was uppermost in their minds. A conjoined legal opinion advised that patients who satisfied the criteria of brain death should be pronounced dead before organ removal was attempted.

The recommendations of the Harvard report were gratefully adopted by many authorities who were faced with these problems. But the lack of precision in the definition of brain death caused considerable confusion. To deal with this a US President's Commission was appointed, which declared in 1981 that individual death depended on either irreversible cessation of circulatory and respiratory functions or irreversible cessation of all functions of the entire brain.[3] A Uniform Determination of Death Act insisted on "whole brain death" as a sine qua non of brain death. This declaration was later enacted into law and has been accepted by almost all US states. But it continues to cause problems. Taken literally, it would mean that the detection of any activity by any means in any part of the brain—anything less than "whole brain death"—precludes the diagnosis of death, and the removal of the heart from such patients would be unlawful. There have been many reports of various forms of residual electrical and neurohormonal activity in the brain of subjects who otherwise met the criteria of death. Many authors have argued that patients exhibiting these features are not dead and that the concept of brain death is flawed, and some have advocated a return to the traditional cardiopulmonary criteria.[4–9]

Britain has been spared much of this controversy. In 1971 Mohandas and Chou claimed that damage to the brain stem was the crucial component of severe brain damage causing profound irreversible coma.[10] In 1976 the UK Conference of Royal Colleges and their Faculties accepted this and defined brain death as the complete and irreversible loss of function of the brain stem.[11] They discounted the relevance of residual activity in the upper brain; without function of the brain stem, life does not exist. In practice this definition has proved robust. Follow up of a series of over 1300 patients diagnosed as brain dead on the basis of loss of brain stem function showed that cardiopulmonary death ensued rapidly in all cases even when supportive treatment was maintained.[12] Despite the spate of articles in the US press expressing dissatisfaction with their whole brain criteria, Capron has pointed out that the consensus about the determination of death has endured there for more than 30 years.[9] The simpler and reliable UK definition has not evoked similar criticism.

That evening, almost 34 years ago, when I stood at the bedside of my patient wondering what on earth to do, there were no guidelines for testing for the presence of brain death—the concept had not yet been formulated. Today, the recognised formal procedure to establish it would have made my decision a lot easier—and I might even have had a proper night's sleep.

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